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**The Thesis Submitted for the Degree of M.Sc (in the field of
Water Engineering Science)**

**Determining the comparative
advantage of major agricultural crop
production in Bandan regarding water
productivity index**

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Abstract

Ever-increasing population growth and the consequent increase in food demand under freshwater scarcity necessitate the application of unconventional water resources to produce more food. Nevertheless, unmanaged application of these water resources may negatively affect soil and crops. In this research, the possibility of cultivating some major crops with local saline water resources on Bandan region was investigated through a complete block design with three replicates. In this regard, five commonly grown crops in this region, including wheat, barley, canola, safflower, and broad bean were cultivated during 2018-2019 growing season. During the cropping cycle, irrigation was done using saline water with $EC = 7 \text{ dS m}^{-1}$. Crop's seed yield and biological yield were determine for all plots at harvest, and based on the obtained values, harvest index was calculated consequently. Finally, economic water productivity was estimated by dividing crop's economic yield by irrigation water volume. Results showed that broad bean and safflower had the lowest (1570 kg ha^{-1}) and the highest (15755 kg ha^{-1}) yield, respectively. The lowest and highest water productivity was obtained for barley (0.1 kg m^{-3}) and broad bean (1.04 kg m^{-3}), respectively. Likewise, when economic water productivity is considered, broad beans and safflower had, respectively, the lowest (-160 Rls m^{-3}) and highest (1532 Rls m^{-3}) values. Since net interest was considered when estimating economic water productivity, the negative value for broad beans indicate that the costs wend beyond the benefits; which itself is an indication of high sensitivity of this crop to saline water.

Keywords: Salinity stress, Harvest index, Leaf area index, Canola, Safflower